taking into account the neighboring Fe-atoms up to the 6th nearest. The calculated value was estimated as 4.0×10^5 erg/cm^3 at 0 K. The temperature dependence of K_1 taken into account K_d do not obey the third power function supposed for the crystalline field anisotropy. The value of K_1 may be due to the anisotropic exchange as well as the crystalline field anisotropy.

Since the ferromagnetic-paramagnetic transition at T_c is accompanied by the first order transition with a lattice distortion, the pressure variation of T_c, $\Delta T_c/\Delta p$, has to satisfy the thermodynamical Clausius Clapeyron equation;

$$\frac{\Delta T_c}{\Delta p}=\frac{\Delta V}{\Delta S}, \tag{3}$$

where ΔS and ΔV are the discontinuous jumps in the entropy and the volume at T_c, respectively. We have measured the variation of T_c under the hydrostatic pressures up to 6 kbar and obtained as $\Delta T_c/\Delta P=-3.46\times10^{-3}$ deg/bar. Using the value of ΔV obtained in this experiment, the magnitude of ΔS is estimated as 0.04 cal/mol·deg, which is relatively small for a first-order transition.

According to Rodbell and Bean,[17] if the exchange interaction which give rise to the magnetic ordering strongly depends upon the interatomic specing, the Curie temperature T_c is expressed by the following equation,

$$T_c=T_0\left(1+\beta\frac{V-V_0}{V_0}\right), \tag{4}$$

where V_0 is the specific volume in the absence of exchange interaction, T_0 the Curie temperature of the rigid lattice and β the ratio between the changes of T_c and volume. On the basis of the molecular field approximation, the exchange striction at 0 K from the equilibrium condition is given by

$$\left(\frac{V-V_0}{V}\right)=\frac{3}{2}\frac{j^2}{j(j+1)}NkKT_0\beta. \tag{5}$$

Where j is the total angular momentum, K is the compressibility, N is the number of magnetic atoms per unit volume, k is the Boltzman constant. Here, if we define the parameter as

$$\eta=40NkKT_0\beta^2[j^2(j+1)^2/(2j+1)^4-1], \tag{6}$$

we notice that for $\eta<1$ the transition is of second order, while for $\eta>1$, the transition is of first order. If the ferromagnetic-paramagnetic transition is of first order, the volume change at T_c is given by

$$\left(\frac{\Delta V}{V}\right)=\frac{3}{2}\frac{j^2}{j(j+1)}NkKT_0\beta\sigma_c^2, \tag{7}$$

where σ_c is the jump of the relative magnetization at T_c. Also, the pressure variation of the Curie temperature can be derived from eq. (4) as,

$$\frac{\partial T_c}{\partial p}=-\beta KT_0. \tag{8}$$

We can estimate the exchange striction at 0 K and the volume change at T_c from eqs. (5), (6), (7) and (8). On substituting the value of K, T_0, and $\Delta T_c/\Delta P$ into eq. (8), we have the value of $\beta=28.8$. Here, we used the value of $K=4.8\times10^{-13}$ cm^2/dyne for Fe_2P measured by means of the X-ray diffraction under high pressure, which will be reported in near future, the value of $T_0=250$ K obtained by extrapolating the Brillouin function curve for $j=\frac{3}{2}$ to zero magnetization. On substituting the values of $\beta=28.8$ and $j=\frac{3}{2}$ deduced by the magnetization at 0 K in eq. (6) we have $\eta=1.20$. This suggests that the transition at T_c is of first order. The exchange striction at 0 K and the jump of volume at T_c are estimated to be 9.1×10^{-3} and 1.6×10^{-3}, from eqs. (5) and (7), respectively. Here, the value of σ_c was used 0.44 obtained from the jump of the hyperfine field at T_c determined by Wäppling *et al.*[11] These estimated values are in reasonable agreement with the experimental values of 9.5×10^{-3} and 0.64×10^{-3}, respectively. In conclusion, the ferromagnetic to paramagnetic transition at T_c of Fe_2P might be accompanied by the first-order transition with a lattice distortion due to magnetoelastic effects.

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